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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/541,563	07/06/2005	Theodore A Resnick	PHUS030005US	5828

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS
595 MINER ROAD
CLEVELAND, OH 44143

EXAMINER	
SONG, HOON K	

ART UNIT	PAPER NUMBER
2882	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/541,563	RESNICK, THEODORE A	
	Examiner	Art Unit	
	Hoon Song	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5,6,9-13,16,18,19 and 22* is/are rejected.

7)☒ Claim(s) *3,4,7,8,14,15,17,20 and 21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 July 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/6/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities:

Headings for each section are missing.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 5, 9, 11-13, 16 and 22 rejected under 35 U.S.C. 102(b) as being anticipated by Schaaf et al. (US 6111933).

Regarding claim 1, Schaaf teaches a dose-modulated irradiating system for an x-ray tube with a cathode including a filament 14 that generates electrons which are focused into a beam and an anode 13 that generates x-rays responsive to the electron beam, the dose-modulated irradiating system further including:

at least one electrostatic control electrode 15, 22, 23 arranged to electrostatically reduce an intensity of the electron beam; and

a biasing means for applying a time-varying electrical bias to the electrostatic control electrode to vary the intensity of the electron beam (abstract, column 5 line 23+).

Regarding claim 2, Schaaf teaches the electrostatic control electrode includes an electrostatic grid with grid electrodes 15, 22, 23 arranged for steering the electron beam responsive to an applied differential potential (column 6 line 5+).

Regarding claim 5, Schaaf teaches a rotating gantry on which the x-ray tube is disposed, the rotating gantry defining an examination region into which the x-ray tube transmits an x-ray beam; a two-dimensional x-ray detector arranged across the examination region from the x-ray tube that measures a spatially-varying intensity of the x-ray beam after the x-ray beam passes through the examination region; and a processor that reconstructs a computed tomographic image of an imaging subject disposed in the examination region based on the spatially-varying intensity of the x-ray beam measured by the x-ray detector at a plurality of positions of the x-ray source (column 6 line 22).

Regarding claim 9, Schaaf teaches the electrostatic control electrode includes paired grid electrodes 22 23 arranged on opposite sides of the filament, and the electrostatic control modulator additionally applies a switched differential electrical bias component applied to the grid electrodes that causes a wobbling of the electron beam (figure 4).

Regarding claim 11, Schaaf teaches an electromagnetic deflector that selectively deflects the electron beam (figure 4).

Regarding claim 12, Schaaf teaches a computed tomography imaging scanner on which the cathode, the anode, and the electrostatic control electrode are mounted as a unitary x-ray tube unit (column 6 line 22).

Regarding claim 13, Schaaf teaches a method for dose-modulating an output of an x-ray tube that includes a cathode having a filament that generates electrons which are focused into a beam, an anode that generates x-rays responsive to the electron beam, and an electrostatic control electrode that electrostatically adjusts an intensity of the electron beam, the method including:

applying a time-varying electrical bias to the electrostatic control electrode to produce a first time-varying intensity modulation of the electron beam (abstract, column 5 line 23+).

Regarding claim 16, Schaaf teaches synchronizing the applying of the time-varying electrical bias with a rotation of a rotating gantry of a computed tomography apparatus on which the x-ray tube is arranged.

Regarding claim 22, Schaaf teaches the time varying electrical bias applied to the electrostatic control electrode is an analog time varying electrical bias.

Claims 1-2, 5-6, 11-13, 16 and 2222 are rejected under 35 U.S.C. 102(b) as being anticipated by Gard et al. (US 5550889).

Regarding claim 1, Gard teaches a dose-modulated irradiating system for an x-ray tube with a cathode including a filament 70 that generates electrons which are focused into a beam and an anode 47 that generates x-rays responsive to the electron beam, the dose-modulated irradiating system further including:

at least one electrostatic control electrode 41 arranged to electrostatically reduce an intensity of the electron beam; and

a biasing means for applying a time-varying (variable power supply) electrical bias to the electrostatic control electrode to vary the intensity of the electron beam (wobble input).

Regarding claim 2, Gard teaches the electrostatic control electrode includes an electrostatic grid with grid electrodes 41 arranged for steering the electron beam responsive to an applied differential potential.

Regarding claim 5, Gard teaches a rotating gantry on which the x-ray tube is disposed, the rotating gantry defining an examination region into which the x-ray tube transmits an x-ray beam; a two-dimensional x-ray detector arranged across the examination region from the x-ray tube that measures a spatially-varying intensity of the x-ray beam after the x-ray beam passes through the examination region; and a processor that reconstructs a computed tomographic image of an imaging subject disposed in the examination region based on the spatially-varying intensity of the x-ray beam measured by the x-ray detector at a plurality of positions of the x-ray source (figure 2).

Regarding claim 6, Gard teaches the electrostatic control electrode includes an electrostatic grid with grid electrodes arranged about the filament, the dose-modulated irradiating system further including: a second biasing means for applying a switched difference electrical bias to the grid electrodes to wobble the electron beam between alternating focal spots (figure 3, column 3 lines 16+).

Regarding claim 11, Gard teaches an electromagnetic deflector that selectively deflects the electron beam (figure 3).

Regarding claim 12, Gard teaches a computed tomography imaging scanner on which the cathode, the anode, and the electrostatic control electrode are mounted as a unitary x-ray tube unit (figure 3).

Regarding claim 13, Gard teaches a method for dose-modulating an output of an x-ray tube that includes a cathode having a filament that generates electrons which are focused into a beam, an anode that generates x-rays responsive to the electron beam, and an electrostatic control electrode that electrostatically adjusts an intensity of the electron beam, the method including:

applying a time-varying electrical bias to the electrostatic control electrode to produce a first time-varying intensity modulation of the electron beam (figure 3, column 3 lines 16+).

Regarding claim 16, Gard teaches synchronizing the applying of the time-varying electrical bias with a rotation of a rotating gantry of a computed tomography apparatus on which the x-ray tube is arranged (figure 2).

Regarding claim 22, Gard teaches the time varying electrical bias applied to the electrostatic control electrode is an analog time varying electrical bias (figure 3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schaaf in view of Mika et al. (US 5748701).

Regarding claim 10, Schaaf fails to teach the electrostatic control electrode includes a Wehnelt cylinder.

Mika teaches a Wehnelt cylinder.

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the x-ray source of Schaaf with the Wehnelt cylinder as taught by Mika, since the device would further improve the electron focusing.

Allowable Subject Matter

Claims 3-4, 7-8, 14-15, 17 and 20-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 3-4, the prior art fails to teach a current-modulating means for applying a time-varying filament current through the filament; and a control means for controlling the biasing means and the current-modulating means to produce a selected time varying intensity of the electron beam as claimed in dependent claim 3.

Regarding claim 7, the prior art fails to teach a filament current controller that applies a time-varying filament current through the filament; and a controller that controls the biasing means and the filament current controller to produce a selected

time varying radiation dosage applied to the imaging subject as claimed in dependent claim 7.

Regarding claim 8, the prior art fails to teach a filament current controller that applies a time-varying filament current through the filament; a feedback element that computes a control signal corresponding to a rate of radiation delivered to the imaging subject based on the spatially-varying intensity of the x-ray beam measured by the x-ray detector; and a controller that controls the biasing means and the filament current controller to produce a substantially constant control signal as claimed in dependent claim 8.

Regarding claims 14-15, the prior art fails to teach the method of simultaneously with the applying of a time varying electrical bias, applying a time-varying filament current to produce a second time-varying intensity modulation of the electron beam, the first and second time-varying intensity modulations cascading to enhance a dynamic range over which the intensity of the electron beam is modulated as claimed in dependent claim 14.

Regarding claim 17, the prior art fails to teach the x-ray tube is a radiation source component of a computed tomography imaging scanner, the method further including: imaging an imaging subject using the computed tomography imaging scanner; during the imaging, measuring x-ray intensities using an x-ray detector component of the computed tomography imaging scanner; estimating a temporally varying radiation dose delivery rate of x-ray radiation delivered to the imaging subject during the imaging based on the measured x-ray intensities; and controlling the applying of the time-

varying electrical bias during the imaging based on the estimated temporally varying radiation dose delivery rate.

Regarding claims 20-21, the prior art fails to teach controlling a filament current of the cathode to produce a second time-varying intensity modulation of the electron beam, the first and second time-varying intensity modulations of the electron beam being temporally coordinated to provide the modulation of the radiation delivery rate as claimed in dependent claim 20.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoon Song whose telephone number is (571) 272-2494. The examiner can normally be reached on 9:30 AM - 7 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272 - 2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Hoon Song
Primary Examiner
Art Unit 2882

6/24/07